

Example 3

outcomes	prob
UNC	0.6
Duke	0.3
NCState	0.1
UVA	0.1

$$1.1 = 110\%$$

$$\underline{P(S) = 100\%}$$

$$0.9$$

$$\frac{1}{P(H) = 30\% = 0.3}$$

$$P(H^c) = 70\% = 0.7$$

$$\frac{2}{AB+ = 0.06}$$

$$= 6\%$$

$$\begin{aligned}
 P(A+ \text{ or } B-) &= P(A+) + P(B-) \\
 P(A+ \cup B-) &= 0.16 + 0.17 = \\
 &\boxed{0.33 = 33\%}
 \end{aligned}$$

$$\begin{aligned}
 P(O- \text{ or } O+) &= P(O-) + P(O+) \\
 P(O- \cup O+) &= 0.1 + 0.11 \\
 &\quad \textcircled{0.21}
 \end{aligned}$$

$$P(AB^+ \text{ or } A^+) = P(AB^+) + P(A^+)$$

$$P(AB^+ \cup A^+) = 0.06 + 0.16$$

$$= 0.22$$

add!

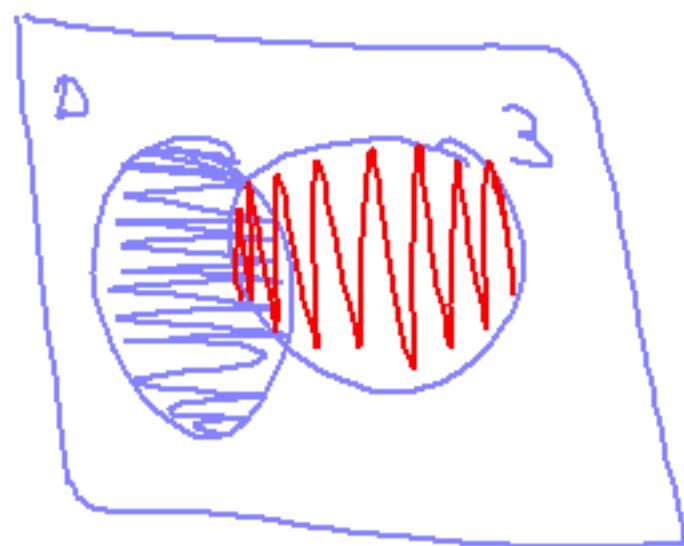
$$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B)$$

$$P(D) = \frac{13}{52} = \frac{1}{4} = 25\%$$

$$P(3) = \frac{4}{52} =$$

$$P(D \text{ or } 3) = \frac{13}{52} + \frac{4}{52} = \frac{17}{52} - \frac{1}{52} = \frac{16}{52}$$

$$P(D \cup 3) = P(D) + P(3) - P(D \cap 3)$$



$$P(B) = \frac{26}{52}$$

$$P(J) = \frac{4}{52}$$

$$P(B \text{ or } J) = P(B) + P(J) - P(B \cap J)$$

$$P(B \cup J) = \frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52}$$

* $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

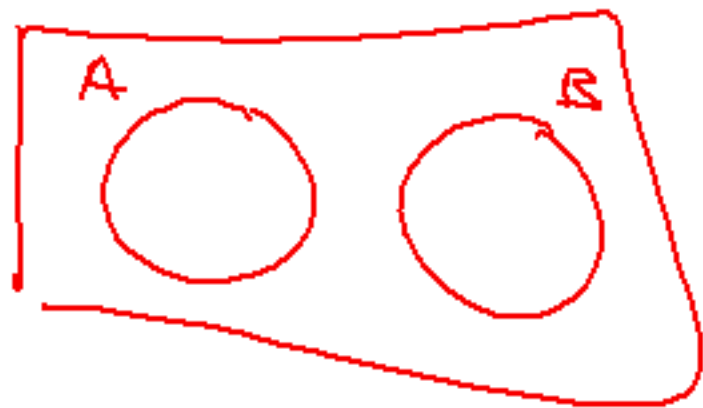
* Disjoint....

two events don't have any outcomes in common.

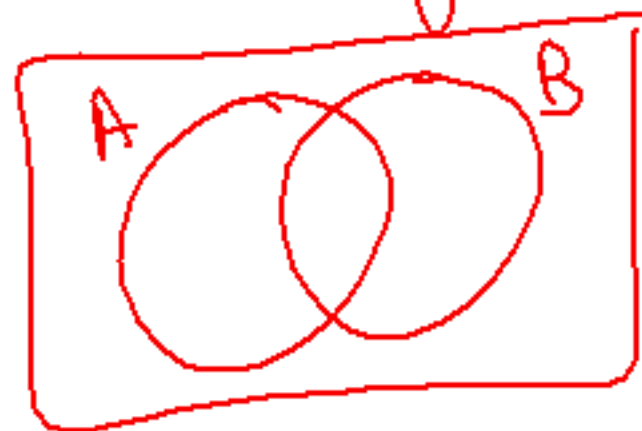
$$P(A \cap B) = 0\%$$

Ex: picking a red card \cap black card
rolling dice & flipping a coin

Disjoint

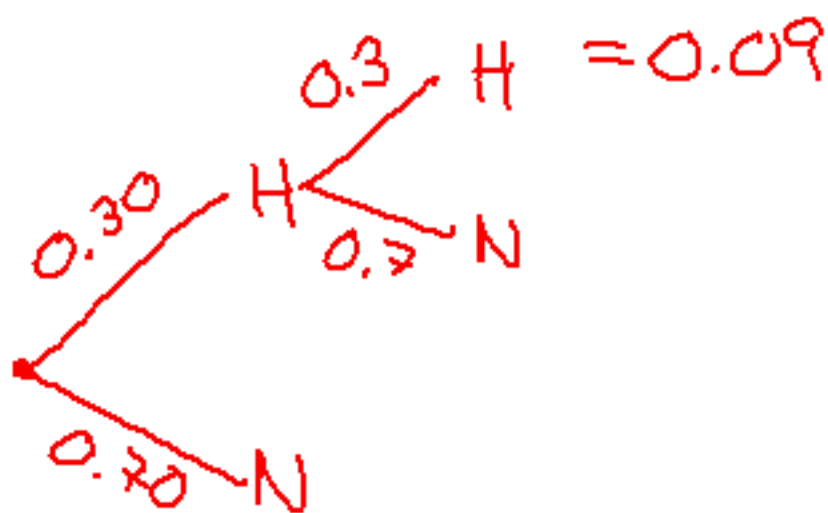


Not disjoint



Ex. 3 $P(H) = 30\% = 0.3$

$P(H \overset{\text{and}}{\downarrow} H) = (0.3)(0.3) = 0.09$



$$P(H \cap H \cap H) = (0.3)(0.3)(0.3) = 0.027$$

$$P(H \cap H \cap N) = (0.3)(0.3)(0.7) = 0.063$$

Ex 4 10

$$P(R) = \frac{3}{10} \quad P(\text{Gr.}) = \frac{2}{10} \quad P(BI) = \frac{5}{10}$$

$$P(R \cap BI) = P(R) \cdot P(BI)$$

$$= \frac{3}{10} \cdot \frac{5}{10} = \textcircled{0.15}$$

$$P(G \cap R) = \left(\frac{2}{10}\right)\left(\frac{3}{10}\right) = 6\% = 0.06$$

$$P(B \cap B) = \left(\frac{5}{10}\right)\left(\frac{5}{10}\right) = 0.25$$

$$P(A \cap B) = P(A) \cdot P(B)$$

$$P(R) = 3/10 \quad P(G) = 2/10 \quad P(B) = 5/10$$

$$P(R \cap B) = P(R) \cdot P(B|R) = (3/10) \cdot (5/9) = 0.1667$$

$$P(B \cap B) = (5/10)(4/9) = 0.222$$

$$P(G \cap R) = (2/10)(3/9) = 0.666$$

Conditional Prob:

$$P(R) \cdot P(B|R)$$

given that

$$P(B) \cdot P(B|B) \cdot P(R|G)$$

$$P(A|B)$$

2nd event

1st event

$$\frac{P(B|A) = P(B)}{\text{Indep}}$$

$$\frac{\text{Independent:}}{P(A) \cdot P(B)}$$

$$* P(A \cap B) = P(A) \cdot P(B|A)$$

Ex $\overset{\text{indep.}}{3 \text{ \& } 4}$, the events didn't affect each other

Independent.....

The 1st event happening doesn't affect the 2nd event.

$$? \quad P(B|A) \neq P(A|B)$$

$$P(R|B) = \frac{3}{9}$$

$$P(B|R) = \frac{5}{9}$$

$$P(R \cap B)$$

④

$$\textcircled{6} P(A \cap B) = P(A) \cdot P(B|A)$$

* *

Probability rules worksheet #1 answers

$$\begin{aligned} 1) \text{ a. } P(A \cup B) &= P(A) + P(B) - P(A \text{ and } B) \\ &= 0.26 + 0.41 - 0.1 \\ &= 0.57 \end{aligned}$$

$$\text{b. } P(B|A)$$

$$\begin{aligned} P(A \text{ and } B) &= P(A) * P(B|A) \\ 0.1 &= 0.26 * P(B|A) \\ 0.385 &= P(B|A) \end{aligned}$$

$$\begin{aligned} \frac{0.1}{0.26} &= \frac{0.26}{0.26} \times \\ 0.385 &= \times \end{aligned}$$

c. Disjoint = no intersection/overlap, so $P(A \text{ and } B) = 0$
THEY ARE NOT DISJOINT because $P(A \text{ and } B) = 0.1$

$$\begin{aligned} 2. P(A \text{ and } B) &= P(A) * P(B) \text{ (when independent)} \\ &= 0.42 * 0.33 \\ &= 0.1386 \end{aligned}$$

$$\begin{aligned} 3. a. P(A \text{ and } B) &= P(A) * P(B|A) \\ &= 0.6 * 0.2 \\ &= 0.12 \end{aligned}$$

$$\begin{aligned} b. P(A \cup B) &= P(A) + P(B) - P(A \text{ and } B) \\ &= 0.6 + 0.34 - 0.12 \\ &= 0.82 \end{aligned}$$

4.

a) {6, 12}

b) 2/20

c) {2,3,5,6,9,1,12,13,15,17,19}

d) 3/ 20

e) 10/ 20

f) ~~16/20~~ 2/20

g) 10/ 20

h) {1,2,3,4,5,6,7,8,9,10,11,12,13,15,17,19}